

REMARKS

Favorable reconsideration of this application, in light of the following discussion, is respectfully requested.

Claims 1-25 are pending. Claims 1, 12 and 18 are independent.

In the Official Action, claims 1-7 were rejected under 35 U.S.C. § 102(b) as being anticipated by Antonacopoulos (flexible page segmentation using the background, hereinafter “Anton”); claims 9, 12-15 and 18-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Anton; claims 8, 12 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Anton in view of Ittner (EP 0621553); claim 17 and 23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Anton in view of Stolin (U.S. Patent No. 6,175,844); and claims 10-11 and 24-25 were indicated as containing allowable subject matter.

Applicants acknowledge with appreciation the indication of allowable subject matter.

Briefly recapitulating, claim 1 is directed to

A method of segmenting an image of pixels into a number of contiguous fields corresponding to lay-out elements of the image, the pixels having a value representing an intensity and/or color of a picture element, the method comprising:

constructing a graph having vertices and edges connecting the vertices, on the basis of background areas in the image, said graph edges corresponding to field separators that together delineate the contiguous fields of the image, wherein each pixel is comprised in one single field of the number of contiguous fields;

constructing a list of contiguous shortest cycles that together completely cover at least a part of the image, a shortest cycle being defined as a closed path from a vertex back to that same vertex via the edges of the graph, that has the lowest sum of weights of edges of all possible closed paths from said vertex back to said vertex; and

defining the shortest cycles of the list as the contiguous fields of the image.

Independent claim 12 is directed to a computer-readable storage medium including computer-executable instructions for, *inter alia*, “constructing a graph having vertices and edges connecting the vertices, on the basis of background areas in the image, said graph edges corresponding to field separators that together delineate the contiguous fields of the image, wherein each pixel is comprised in one single field of the number of contiguous fields” and “defining the shortest cycles of the list as the contiguous fields of the image.”

Independent claim 18 is directed to a device including, *inter alia*, a graph constructor for “constructing a graph having vertices and edges connecting the vertices, on the basis of background areas in the image, said graph edges corresponding to field separators that together delineate the contiguous fields of the image, wherein each pixel is comprised in one single field of the number of contiguous fields” and “defining the shortest cycles of the list as the contiguous fields of the image.”

Anton describes a method for document page segmentation that includes the analysis of background whitespace that surrounds the printed regions on a page. The Abstract of Anton notes that the method of Anton does not make any assumptions about the shape of the regions as opposed to approaches which assume the printed regions are rectangular. The method of Anton identifies and describes regions of complex shapes and requires no *a priori* knowledge. The background whitespace is covered with tiles and the contour of each region is identified by tracing through these white tiles.

As seen in Figure 8 of Anton, the contours of the segmented regions follow the shape of the region of the original text very closely. Also, various layout elements of Anton may be considered to be contiguous. Thus, the graph of Anton contains cycles of multiple edges,

creating a contour of edges of white tiles which the follow the shape of the layout region very closely.

However, Anton does not disclose or suggest using contiguous fields where each pixel is comprised in one single field of a number of contiguous fields and then defining the shortest cycles of the list [of contiguous shortest cycles] as the contiguous fields of the image. As explained in Applicants' specification, the term "each pixel is comprised in one single field of the number of contiguous fields" means, e.g.: 1) no pixel lies in two fields; and 2) there is no pixel that lies in no field. While Anton describes features where no pixel lies in two fields, Anton does not disclose or suggest features where there is no pixel that lies in no field. In fact, by using the technique of Anton, there will be pixels that lie in no field because the contours of a page segment follow closely the shape of a region. Indeed, each of Figs. 6-8, 10 and 12 of Anton show many pixels that lie in no field. For the Examiner's convenience, copies of Anton's Figs. 6-8 are attached hereto with the number 100 and an arrow added to show where there pixels that lie in no field.

Thus, the feature of "no pixel lies in two fields" cannot be equal to the term "each pixel is comprised in one single field of the number of contiguous fields," and the feature "no pixel that lies in no field." is not taught by Anton.

Furthermore, by using contiguous fields where each pixel is comprised in one single field of a number of contiguous fields and then defining the shortest cycles of the list [of contiguous shortest cycles] as the contiguous fields of the image, Applicants' invention provides the advantage that when the layout elements of the image are further processed in preparation for printing or editing, every pixel is determined to be part of precisely one layer element. This

precise association of pixels to layer elements provides an improved and comparatively easy method of graph construction. In contrast, because Anton does not disclose that there is “no pixel that lies in no field,” the method of Anton does not achieve the benefits achieved with Applicants’ invention.

MPEP § 2131 notes that “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). See also MPEP § 2131.02. “The identical invention must be shown in as complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Because Anton does not disclose or suggest all of the features recited in claims 1, 12 and 18, Anton does not anticipate the invention recited in claims 1, 12 and 18, and all claims depending therefrom.

Applicants have considered the remaining references and submit that none of the remaining references cure the deficiencies of Anton. As none of the cited art, individually or in combination, discloses or suggests at least the above-noted features of independent claims 1, 12 and 18, Applicants submit the inventions defined by claims 1, 12 and 18, and all claims depending therefrom, are not rendered obvious by the asserted references for at least the reasons stated above.¹

¹ MPEP § 2142 “...the prior art reference (or references when combined) must teach or suggest all the claim limitations.

CONCLUSION

In view of the above remarks, it is believed that claims are allowable.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Michael E. Monaco (Reg. No. 52,041) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

In view of the above, each of the claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

Dated: October 9, 2008

Respectfully submitted,

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Attachments: Appendix - Three (3) Sheets of Figures 6-8 from Anton Reference

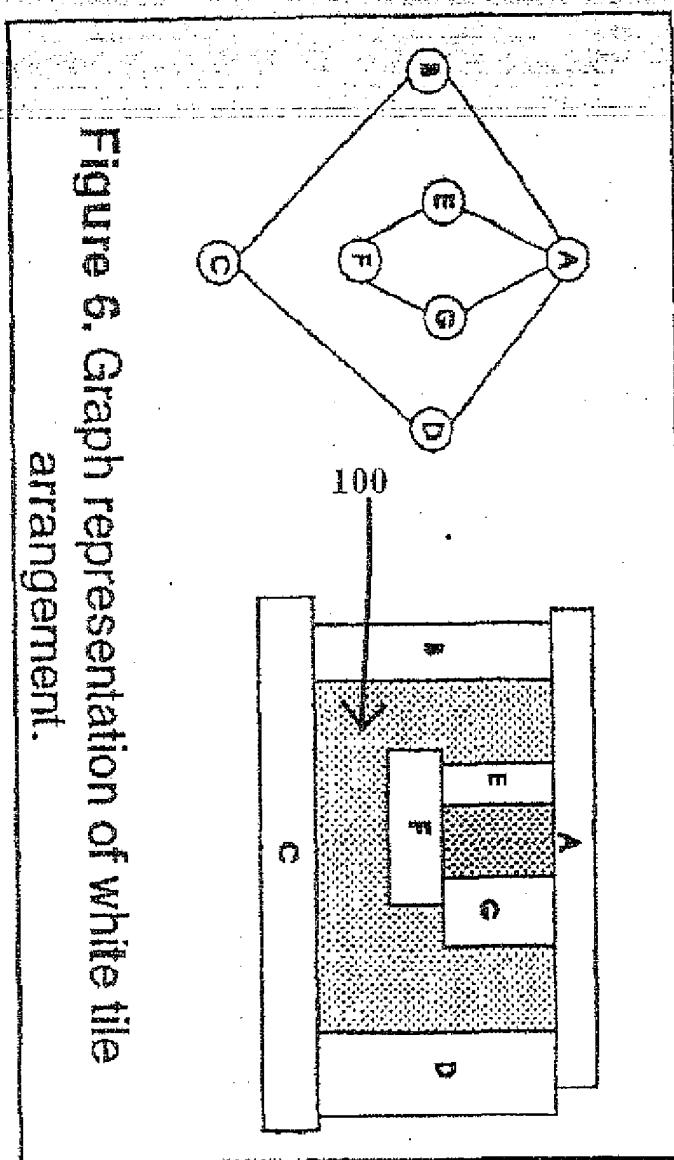


Figure 6. Graph representation of white tile arrangement.

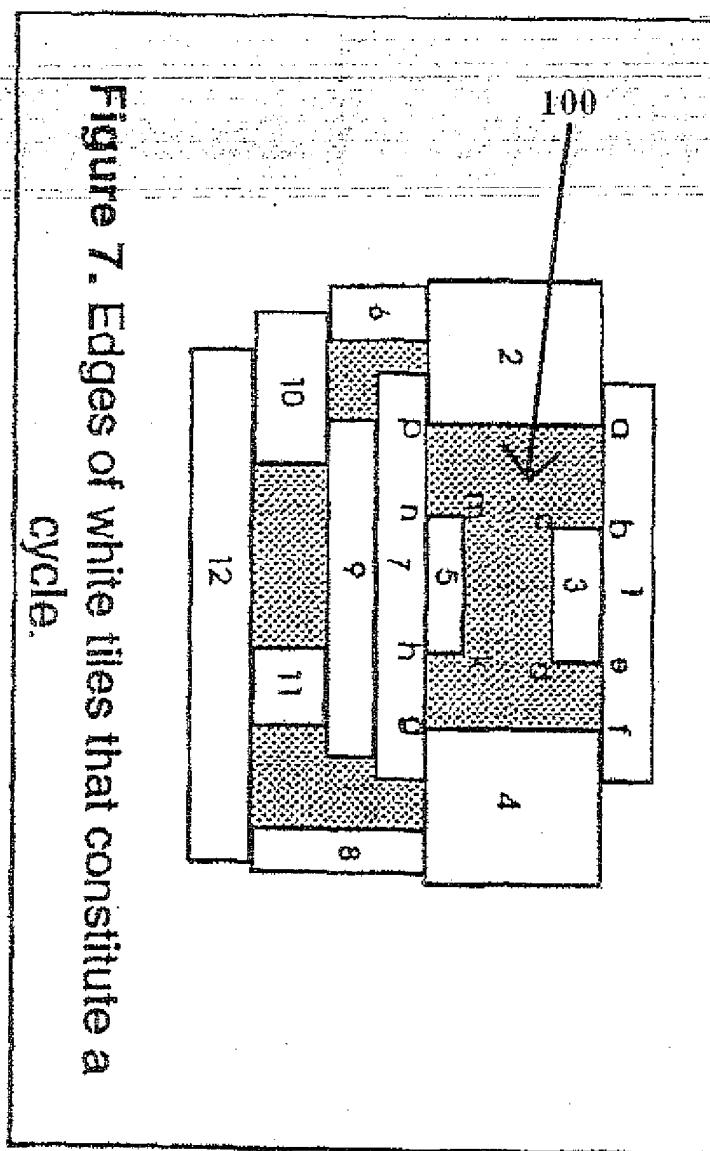


Figure 7. Edges of white tiles that constitute a cycle.

